

WHAT IS CLAIMED IS:

1. A steering state detecting apparatus comprising:

an input shaft connected to a steering member;

an output shaft;

5 a torsion bar which has a spring constant K and connects the input shaft to the output shaft;

a first sensor portion for outputting an output signal in accordance with rotation of the input shaft which includes a target in a shape of spur gear integrally rotatable with the input shaft including first teeth projected substantially at
10 equal intervals in a peripheral direction of the input shaft, and a magnetic sensor having a magnetoresistive element and arranged to be opposed to the first teeth; and

a second sensor portion for outputting an output signal
15 in accordance with rotation of the output shaft which includes a target in a shape of spur gear integrally rotatable with the output shaft including second teeth projected substantially at equal intervals in a peripheral direction of the output shaft, and a magnetic sensor having a magnetoresistive element and
20 arranged to be opposed to the second teeth,

wherein a steering state at the steering member is detected based on the output signals of the first and second sensor portions, and

wherein following inequality is satisfied:

25 $360(\text{deg}) / Z > T(\text{Nm}) / K (\text{Nm/deg})$

where T represents an allowable maximum value of a rotational torque applied to the steering member and Z represents a number of the first and second teeth.

5 2. The steering state detecting apparatus according to claim 1, wherein a relative angular displacement between the input and output shafts is detected by comparing the output signal of the first sensor portion with the output signal of the second sensor portion without executing a processing of
10 determining whether the output signals are shifted from each other by an amount of one period or more.

3. The steering state detecting apparatus according to claim 1, wherein an axial direction width of the first and
15 second teeth is set to be larger than a detecting width of the magnetic sensor in an axial direction of the input and output shafts by an integration tolerance between the first and second teeth and the magnetic sensor.

20 4. The steering state detecting apparatus according to claim 1, wherein an axial direction width of the first and second teeth is set to be larger than a detecting width of the magnetic sensor in an axial direction of the input and output shafts by 2 through 10 mm.

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